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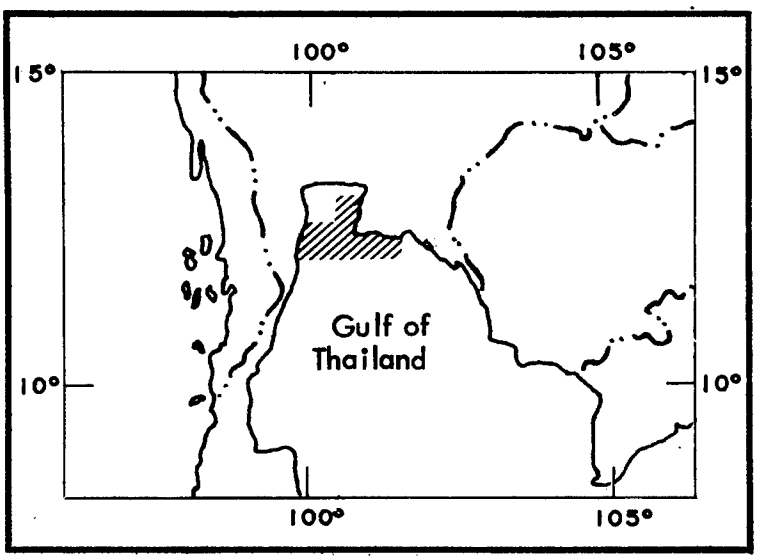
IR NO. 69-55

INFORMAL REPORT

ENVIRONMENTAL DATA REPORT GULF OF THAILAND DECEMBER 1967 TO FEBRUARY 1968



AUGUST 1969

NAVAL OCEANOGRAPHIC OFFICE
WASHINGTON, D. C. 20390

INFORMAL REPORT

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ABSTRACT

The U.S. Naval Oceanographic Office and the Royal Thai Navy conducted a joint environmental survey in the Gulf of Thailand from 20 December 1967 to 21 February 1968. Operations included serial-depth temperature and salinity measurements at 57 station locations and current meter observations at 47 of the stations.

The area surveyed in the Gulf of Thailand was found to be nearly isothermal and isohaline throughout the water column, which attests to a well-developed mixing environment. The tidal currents in the gulf are thought to be responsible for the homogenous nature of the water. Characteristic of the region surveyed was the variance in current direction with depth for any one station location and the change in current vectors over short durations. Measured current speeds ranged to a maximum of 0.8 knot.

DALE E. KENNEY
Nearshore Surveys Division
Oceanographic Surveys Department

This report has been reviewed and is approved for release as an UNCLASSIFIED Informal Report.

L. B. BERTHOLF
Director, Nearshore Surveys Division

TABLE OF CONTENTS

FIGURES

TABLE

APPENDIX

I. INTRODUCTION

An environmental survey was conducted in the Gulf of Thailand as a joint operation of the U.S. Naval Oceanographic Office (NAVOCEANO) and the Royal Thai Navy aboard HTMS BANGRACHAN (MMC 1) from 20 December 1967 to 21 February 1968. Operations were performed in the inner gulf and in the inshore area southeast of Sattahip (Operation Numbers 928026 and 928029). Figure 1 is a locator chart of the survey area.

From 1959 to 1961, a comprehensive survey in the Gulf of Thailand was the Naga Expedition (Wyrtki, 1961). NAVOCEANO surveys aboard USS FIRM (MSO 444) and USS SERRANO (AGS 24) in 1959 and 1961, respectively, supplied further background data. Personal conversation with Royal Thai Navy Hydrographic Office personnel provided valuable information, especially on the oceanographic vagaries that may be encountered within the gulf.

II. OBJECTIVES OF THE SURVEY

The objectives of NAVOCEANO operations aboard BANGRACHAN were to obtain environmental oceanographic data in the inshore areas of the Gulf of Thailand. The data required were current measurements and serial-depth temperatures and salinities.

III. NARRATIVE OF THE SURVEY

Royal Thai Navy (RTN) personnel and one NAVOCEANO oceanographer collected the environmental data from BANGRACHAN. A total of 57 stations was occupied. At each station, a Nansen cast and a bathythermograph (BT) lowering were made, and at 47 of the stations, current measurements were obtained. Figure 2 shows the station locations with current vectors indicated for the stations. Table I presents a station data summary.

IV. METHODS OF COLLECTION AND ANALYSIS

A. Temperature.

A shallow water mechanical BT was lowered at each station location to ascertain the existing temperature structure. The BT traces showed the shallow gulf areas to be nearly isothermal throughout the water column. Because of the isothermal condition, three or four Nansen bottles, each with three protected reversing thermometers, were evenly spaced throughout the water column. The temperatures from the three thermometers were averaged if the values were within 0.05°C. When temperatures differed more than 0.05°C, the values from the more reliable thermometers, based on past performances, were accepted. Thermometer

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Wyrtki, K., 1961. Physical Oceanography of Southeast Asian Waters. NAGA Report. Vol. 2.

performance in the field was checked by rotating individual thermometers from one Nansen bottle to another. A correction factor for errant thermometers was then derived by statistical analysis from the different thermometer pairings. The temperatures from reversing thermometers, after applying standard and individual corrections, are considered accurate to ±0.02°C.

B. Salinity.

Water samples were drawn from the Nansen bottles and forwarded to NAVOCEANO for salinity analyses. Salinities were determined with an Industrial Instruments RS-7A inductive salinometer. Results are considered accurate to ±0.01 o/oo.

C. Conductivity.

Conductivity values were hand computed from Nansen cast temperature and salinity data by the method described in NAVOCEANO Special Publication No. 11, "Tables for the Rapid Computation of Density and Electrical Conductivity of Sea Water."

D. Current Measurements.

A Roberts current meter was used to obtain in situ current measurements. BANGRACHAN was anchored fore and aft, and the meter was suspended from the stern. Readings generally were obtained 3 meters below the surface, at middepth, and 2 meters from the bottom. Interference from the ship's hull precluded any accurate current measurement less than 3 meters below the surface. An EA Recorder was used to give continuous readings. Current velocities were recorded for 4 to 6 minutes or, when low current speeds were evident, until a record of sufficient length was attained to allow a recognizable trend in current vectors.

When current speeds were less than 0.2 knot, the recordings of current direction usually deteriorated. In the presentation of this report, current speeds less than 0.2 knot were not used but are listed on the oceanographic summary sheets in the Appendix as "<2 knot" to indicate the presence of some current.

E. Meteorological Observations.

Meteorological observations were recorded by the oceanographer utilizing hand held equipment and by visual observations. Recorded information consisted of wind vectors, humidity, weather, cloud, and sea and swell observations.

F. Tidal Data.

Tidal values are predicted values from USC&GS tide tables for

Sattahip and Bangkok, Thailand. Cotidal charts were used to approximate tidal ranges and times for the western coast of the survey area.

V. DISPOSITION OF DATA

The current measurement data are on file at NAVOCEANO, and Nansen cast data and BT slides will be on file at the National Oceanographic Data Center. Individual oceanographic summary sheets are presented in the Appendix.

VI. PRELIMINARY ANALYSIS

A. Temperature.

All 57 stations were occupied during the daylight hours from approximately 0800 to 1600 hours (local). Positive temperature gradients, resulting from back radiation during the night, were a common occurrence until late morning when the gradient assumed either an isothermal or a negative profile. The temperature range throughout the water column was 26.50° to 27.73°C. At any one station, the temperature difference from surface to bottom did not exceed 0.54°C, and at 70 percent of the stations, the difference was within 0.30°C. Sea surface temperatures off the western part of the inner gulf averaged 0.25°C higher than surface temperatures off the eastern part and 0.60°C higher than in the area southeast of Sattahip. The nearly isothermal structure observed within the Gulf of Thailand attests to a well-developed mixing environment.

B. Salinity.

The salinity values throughout the survey area ranged from 31.70 to 32.45 o/oo. At any one station, the maximum difference from surface to bottom was 0.10 o/oo, and for 81 percent of the stations, the difference was only 0.03 o/oo. This display of vertical homogeneity and relatively little horizontal variation in salinity values also attests to a region of well-developed mixing.

Salinities in the area southeast of Sattahip were 0.10 to 0.14 o/oo higher than those in the inner gulf. A higher salinity can often be expected in areas outside the inner gulf because of less stream discharge.

C. Current Measurements.

The circulation pattern in the gulf proper is most dependent on the monsoon season. A small, permanent counterclockwise gyre occurs within the inner gulf (from personal conversation with RTN personnel). Subsequently, the gulf, and especially the region where the inner gulf and the gulf proper adjoin (approximately 12°40.0"N), is an area of complex water movement. During the survey period, circulation

within the inner gulf appeared to be dominated by the tidal currents which are thought to be responsible for the homogenous nature of the oceanographic environment.

Measured current speeds ranged to a maximum of 0.8 knot. The higher speeds occurred in the inner gulf during the ebb tide, and the flow was predominantly to the south. Characteristic of the region surveyed was the variance in current direction with depth for any one station and the change in current vectors over short durations. Attendant to these characteristics was the fluctuations of current, for a given depth, between two distinct directions. Station 94 exhibited some of the above characteristics; i.e., at the surface, the current set was 290°; at middepth, the set was either 270° or 070°; and near bottom, the set was 070°.

Data from two 24-hour current stations from the 1961 SERRANO cruise are shown in a time-depth presentation in Figure 3. The two station locations are plotted in Figure 2. The area surrounding station 2 was surveyed by NAVOCEANO in three different years: March 1959, March 1961, and February 1968. Current flow in this area is strongly affected by the coastal topography and the tides and is predominantly of the reversing type with strong horizontal shear currents. Data from station 1A, which is located in the inner gulf, depict the variation in current direction with depth for any one time frame.

D. Meteorological Observations and Tidal Data.

The period of the survey was during the inter-monsoon season, and the winds displayed such random circulation patterns that their effect on the measured oceanographic parameters was masked by tidal influence.

Tides were chiefly diurnal or semidiurnal with large inequalities between the ranges of successive highs or lows. The maximum predicted tidal range at Sattahip on the eastern coast of the inner gulf was 9 feet 8 inches. The tidal range was slightly higher on the western coast.

VII. FUTURE WORK IN THE REGION

The Royal Thai Navy Hydrographic Office has an ambitious oceanographic program outlined for the waters contigious to Thailand. The program will provide for a year-round study of Thai waters and will include the region surveyed by NAVOCEANO.

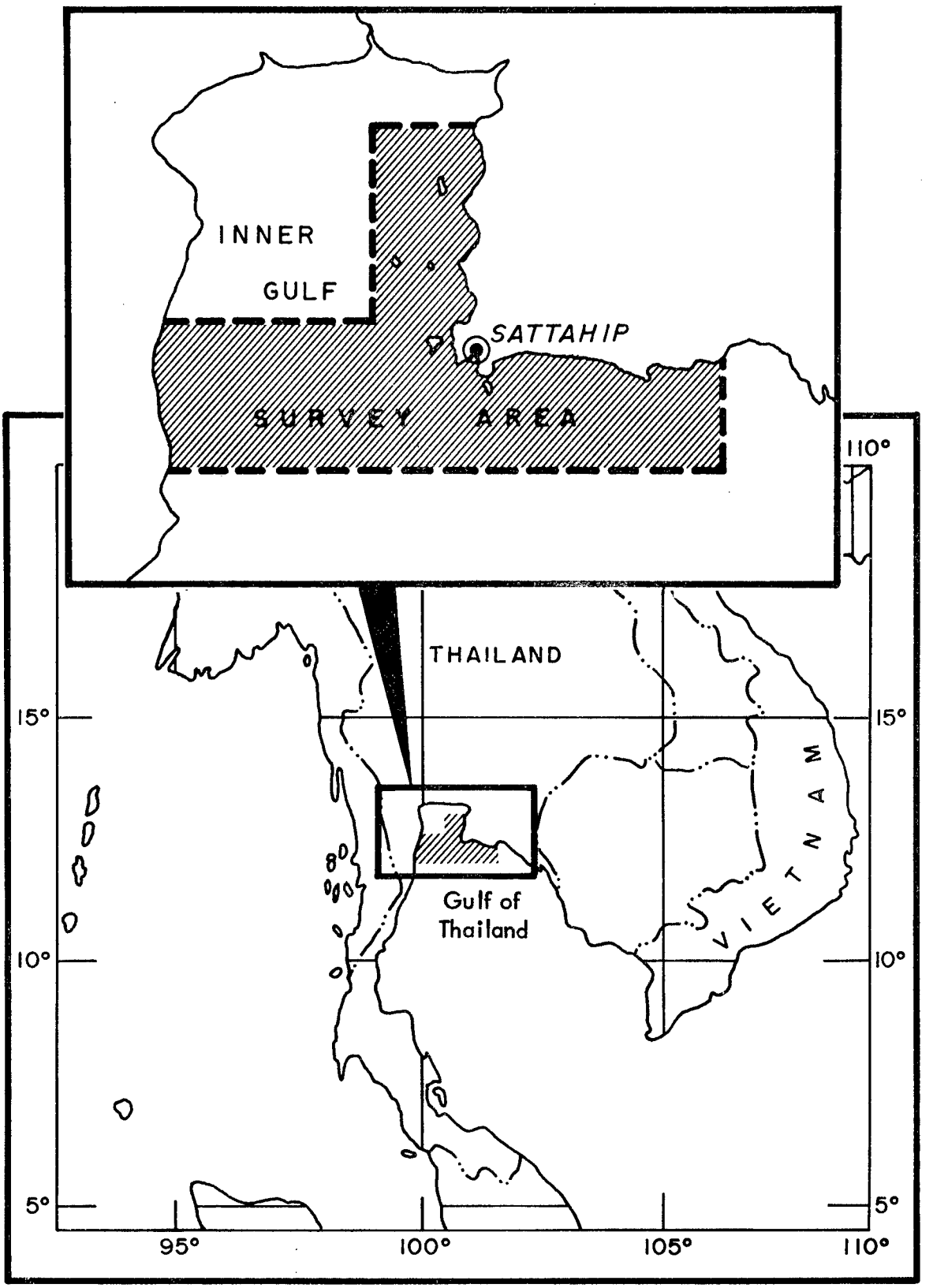


FIGURE 1. Locator Chart of the Survey Area.

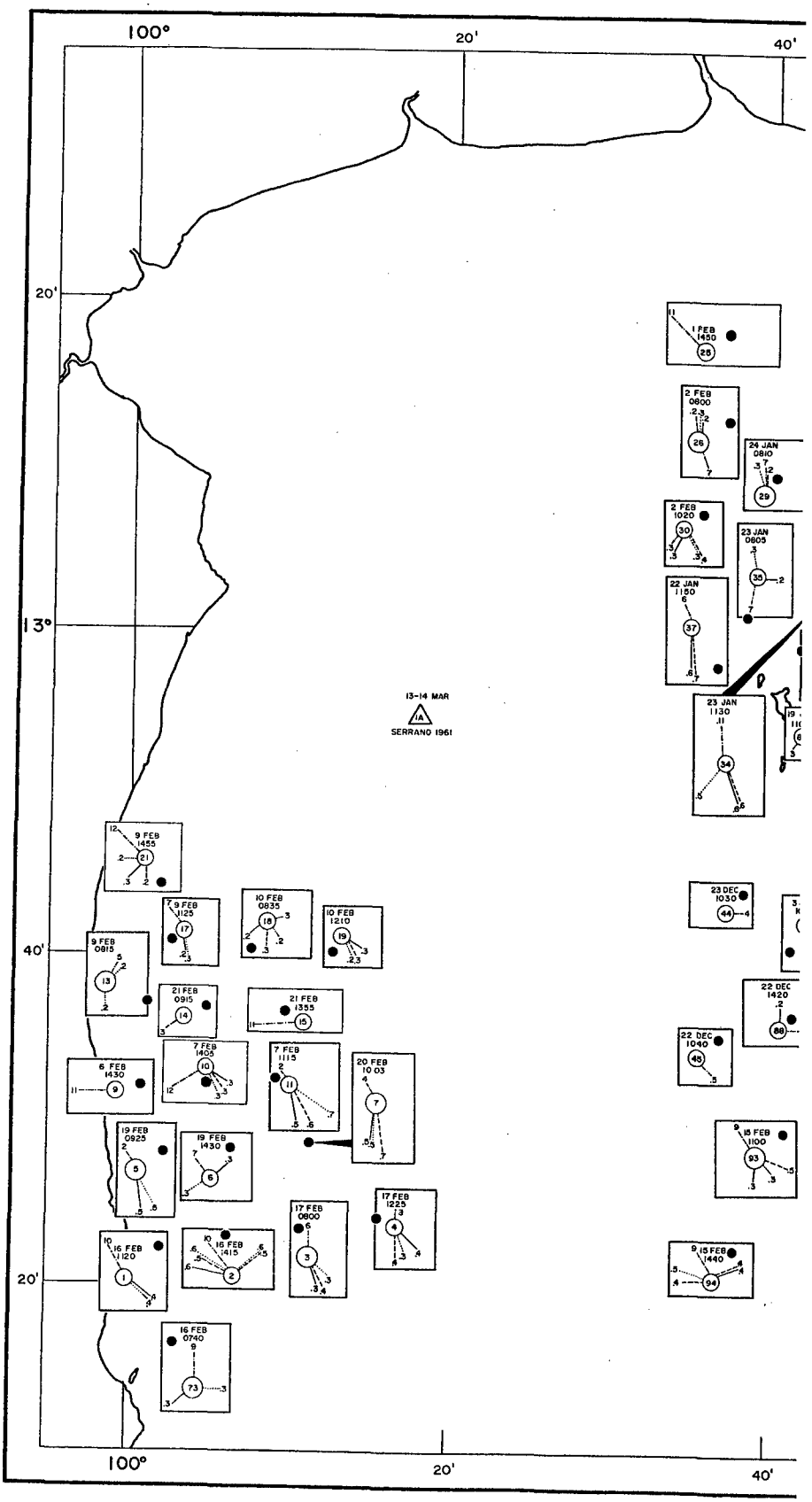
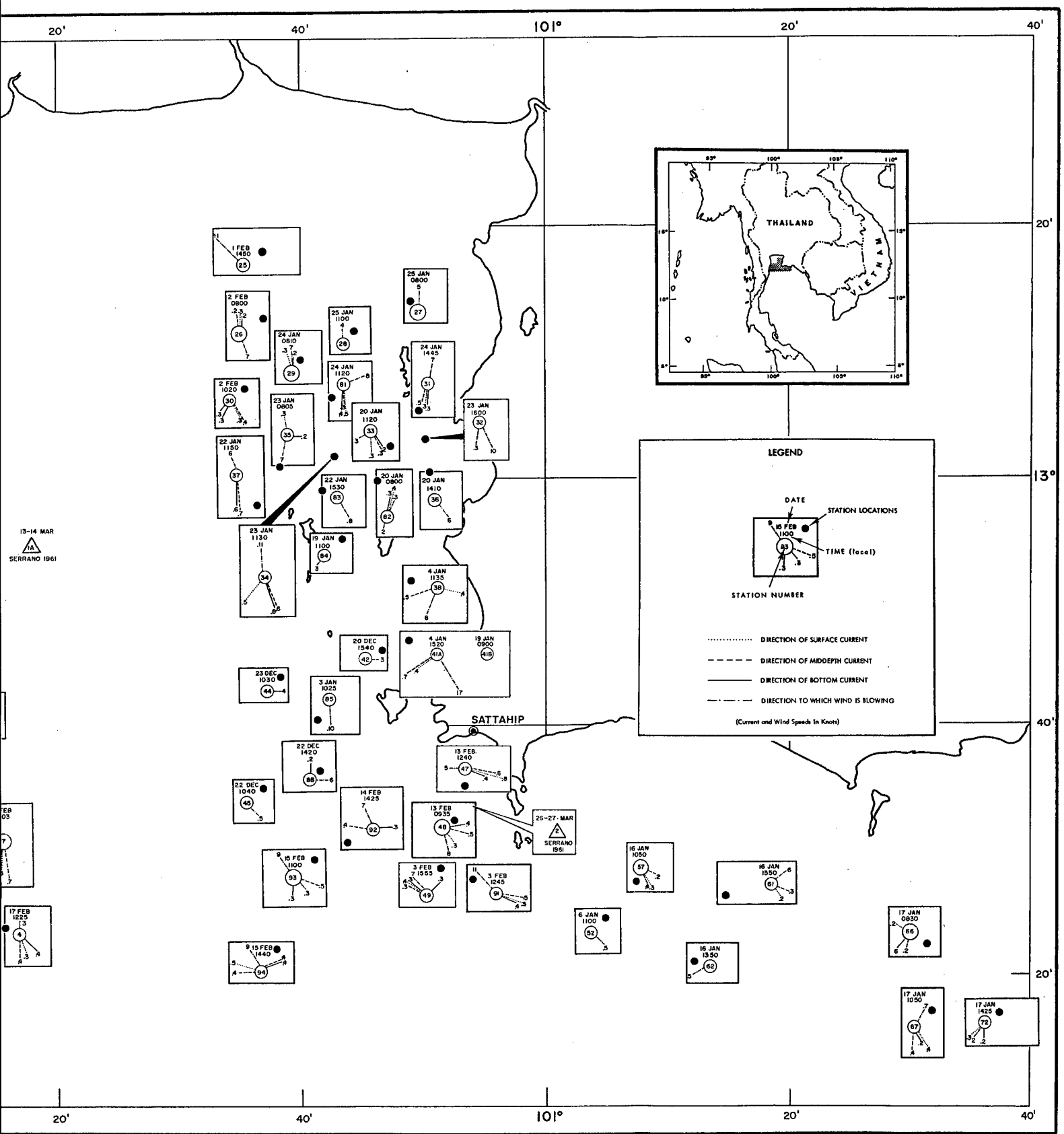


FIGURE 2. Station Locations. The observed current ve
and bottom are indicated.



cations. The observed current vectors at surface, middepth,
m are indicated.

2

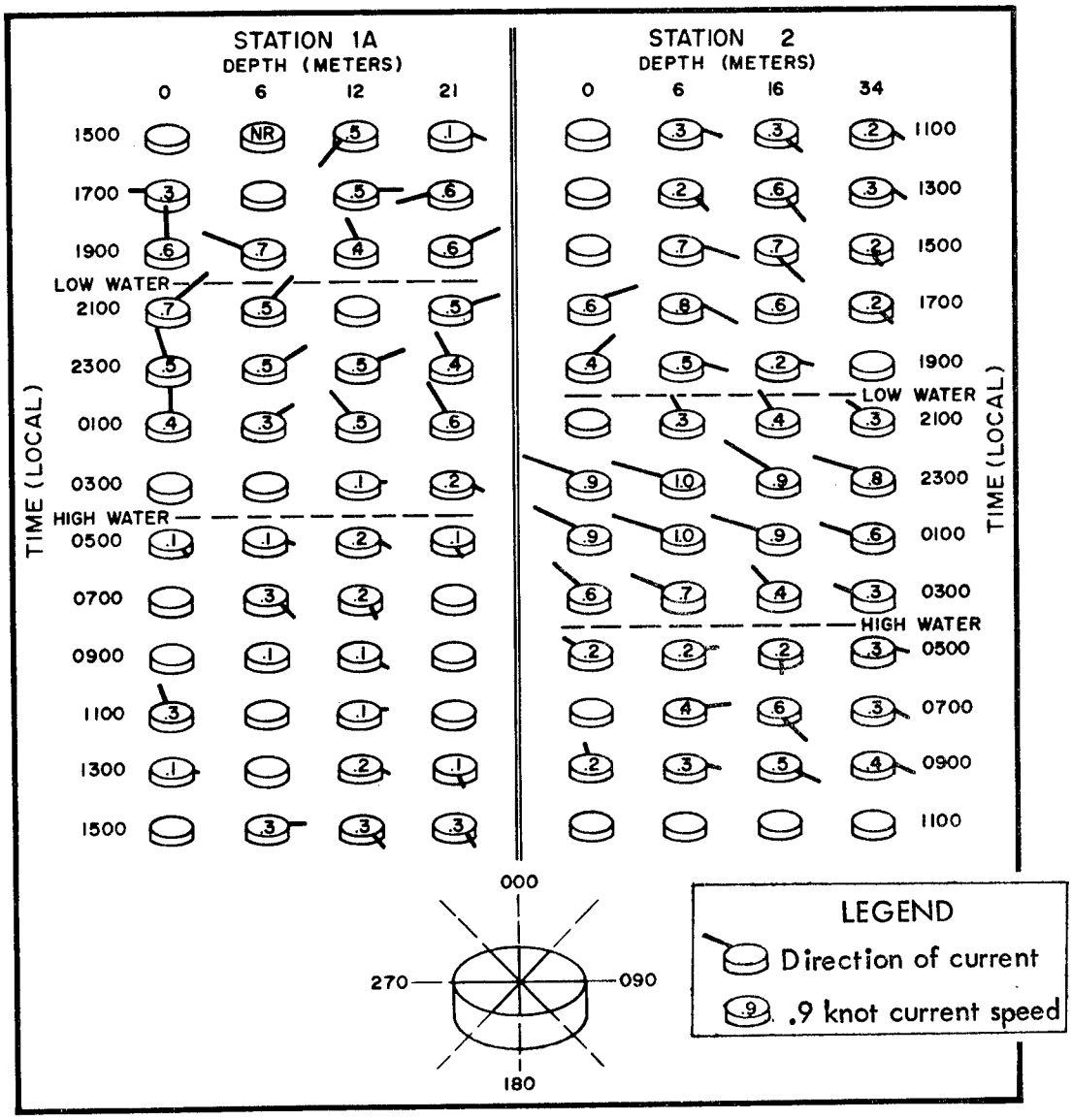


FIGURE 3. Current Data from Two 24-Hour Stations - 1961 SERRANO Cruise.

TABLE 1. STATION DATA SUMMARY

STATION NUMBER	SONIC DEPTH	STATION DEPTH	NANSEN CAST	CURRENT VELOCITY	BT
1	15	13	✓	✓	✓
2	19	17	✓	✓	✓
3	26	24	✓	✓	✓
4	32	30	✓	✓	✓
5	15	13	✓	✓	✓
6	21	19	✓	✓	✓
7	28	26	✓	✓	✓
9	15	13	✓	✓	✓
10	22	20	✓	✓	✓
11	25	23	✓	✓	✓
13	15	13	✓	✓	✓
14	15	13	✓		✓
15	22	19	✓		✓
17	16	14	✓	✓	✓
18	25	23	✓	✓	✓
19	24	22	✓	✓	✓
21	12	10	✓	✓	✓
25	16	14	✓		✓
26	19	17	✓	✓	✓
27	16	14	✓		✓
28	27	25	✓		✓
29	22	20	✓	✓	✓
30	22	20	✓	✓	✓
31	25	23	✓	✓	✓
32	19	17	✓	✓	✓
33	31	29	✓	✓	✓
34	21	20	✓	✓	✓
35	29	27	✓	✓	✓
36	19	18	✓	✓	✓
37	28	26	✓	✓	✓
38	21	20	✓	✓	✓
41A	22	20	✓	✓	✓
41B	19	18	✓		✓
42	24	23	✓		✓
44	38	37	✓		✓
45	33	31	✓		✓
47	25	23	✓	✓	✓
48	38	36	✓	✓	✓
49	40	38	✓	✓	✓
52	30	29	✓	✓	✓
57	22	21	✓	✓	✓
61	30	28	✓	✓	✓
62	31	30	✓	✓	✓
66	31	30	✓	✓	✓
67	34	33	✓	✓	✓
72	33	32	✓	✓	✓
73	17	15	✓	✓	✓
81	26	24	✓	✓	✓
82	31	29	✓	✓	✓
83	21	19	✓	✓	✓
84	34	32	✓	✓	✓
85	43	41	✓		✓
88	44	44	✓	✓	✓
91	35	33	✓	✓	✓
92	32	30	✓	✓	✓
93	32	30	✓	✓	✓
94	31	29	✓	✓	✓

APPENDIX

Oceanographic Station Summary Sheets

All measurements are expressed in Meters, Centigrade, and Knots unless otherwise stated.

WEATHER CODE

0/10 to 3/10 cloud coverage	=	Clear	(Clr)
4/10 to 6/10	=	Broken	(Bkn)
7/10 to 9/10	=	Cloudy	(Cldy)
10/10	=	Overcast	(Ovc)

CLOUD TYPE

Stratus	(St)
Cirrus	(Ci)
Cumulus	(Cu)
Cirro-Cumulus	(CiCu)
Strato-Cumulus	(StCu)

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	16 Feb. 68	0430 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	ST SLICE NO
1	12 23.2'N	100 03.3'E	15	1	50

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (XXS)	WEATHER	CLOUDS
27.42	DIR 150 SPEED 9to11	WET 24.5 DRY 29.4		Clr	COVER 1/10 TYPE Ci

WAVES	SEA	SWELL
DIRECTION (T)	140	
HEIGHT IN FEET	3	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED (KTS)	CURRENT DIR (T)
0	27.42	.0519	32.36	3	.4	130
9	27.18	.0517	32.37	14	.4	125
13	27.21	.0517	32.36			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	16 Feb. 68	0725 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	ST SLICE NO
2	12 23.4'N	100 06.2'E	19	2	51

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (XXS)	WEATHER	CLOUDS
27.43	DIR 140 SPEED 7to14	WET 25.0 DRY 29.4		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (T)	140	
HEIGHT IN FEET	4	
PERIOD IN SEC		

REMARKS: Current directions at 3m and 10m are from two distinct directions.

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED (KTS)	CURRENT DIR (T)
0	27.43	.0517	32.25	3	.5	300to050
8	27.24	.0515	32.25	10	.5	295to050
17	27.18	.0515	32.25	17	.6	280

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	17 Feb. 68	0100 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	ST SLICE NO
3	12 23.4'N	100 11.1'E	26	3	52

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (XXS)	WEATHER	CLOUDS
27.24	DIR 180 SPEED 4to8	WET 25.0 DRY 29.4		Clr	COVER 2/10 TYPE Ci

WAVES	SEA	SWELL
DIRECTION (T)	170	
HEIGHT IN FEET	3	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED (KTS)	CURRENT DIR (T)
0	27.24	.0515	32.25	3	.3	130
12	27.25	.0515	32.24	13	.4	150
24	27.27	.0516	32.27	24	.3	160

VESSEL	AREA	DATE	TIME
HTMS RANGRACHAN	GULF of THAILAND	17 Feb. 68	0525 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	ST SLICE NO
4	12 24.0'N	100 16.0'E	32	4	53

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (XXS)	WEATHER	CLOUDS
27.50	DIR 190 SPEED 1 to 4	WET 25.0 DRY 29.4		Clr	COVER 1/10 TYPE Ci

WAVES	SEA	SWELL
DIRECTION (T)	160	
HEIGHT IN FEET	2	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED (KTS)	CURRENT DIR (T)
0	27.50	.0518	32.25	4	.3	160
12	27.25	.0515	32.25	16	.4	180
30	27.28	.0516	32.24	29	.4	132

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	19 Feb. 68	0225 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
5	12 28.4'N	100 02.3'E	15	5	54

SEA SURF TEMP	WIND (Elev: DIR / SPEED)	AIR TEMP WET / DRY	BAROMETER (ELS)	WEATHER	CLOUDS COVER / TYPE
27.20	DIR 150 / SPEED 1to3	WET 23.9 / DRY 26.7		Clr	COVER 2/10 / TYPE Ci

WAVES	SEA	SWELL
DIRECTION (°T)	110	
HEIGHT IN FEET	2	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (°T)
0	27.20	.0516	32.29	4	.5	150
6	27.25	.0516	32.29	13	.5	175
13	27.26	.0517	32.29			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	19 Feb. 68	0730 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
6	12 28.7'N	100 06.6'E	21	6	55

SEA SURF TEMP	WIND (Elev: DIR / SPEED)	AIR TEMP WET / DRY	BAROMETER (ELS)	WEATHER	CLOUDS COVER / TYPE
27.51	DIR 140 / SPEED 6to8	WET 25.6 / DRY 30.0		Clr	COVER 1/10 / TYPE Cu

WAVES	SEA	SWELL
DIRECTION (°T)	130	
HEIGHT IN FEET	3	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (°T)
0	27.51	.0518	32.23	3	.3	240
9	27.20	.0515	32.22	18	.3	045
19	27.20	.0515	32.23			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	20 Feb. 68	0305 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
7	12 29.0'N	100 11.7'E	28	7	56

SEA SURF TEMP	WIND (Elev: DIR / SPEED)	AIR TEMP WET / DRY	BAROMETER (ELS)	WEATHER	CLOUDS COVER / TYPE
27.31	DIR 150 / SPEED 2to5	WET 25.5 / DRY 27.2		Cldy	COVER 7/10 / TYPE Cu

WAVES	SEA	SWELL
DIRECTION (°T)	110	
HEIGHT IN FEET	3	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (°T)
0	27.31	.0516	32.24	3	.5	185
13	27.28	.0516	32.23	15	.7	175
26	27.32	.0516	32.26	26	.5	190

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	6 Feb. 68	0730 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
9	12 32.7'N	100 01.4'E	15	9	36

SEA SURF TEMP	WIND (Elev: DIR / SPEED)	AIR TEMP WET / DRY	BAROMETER (ELS)	WEATHER	CLOUDS COVER / TYPE
27.59	DIR 090 / SPEED 10to12	WET 25.0 / DRY 29.4		Clr	COVER 0 / TYPE 0

WAVES	SEA	SWELL
DIRECTION (°T)	070	
HEIGHT IN FEET	2	
PERIOD IN SEC		

REMARKS: Current speeds less than 2 kt. Directions are unmeasurable.

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (°T)
0	27.59	.0516	32.02	4	See remarks	
6	27.19	.0512	32.03	12		
13	27.10	.0511	32.01			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	7 Feb. 68	0705 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLICE NO
10	12 32.7'N	100 05.0'E	22	10	38

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (XES)	WEATHER	CLOUDS
27.62	DIR 065 SPEED 10to14	WET 24.5 DRY 28.3		Clr	COVER 3/10 TYPE Ci

WAVES	SEA	SWELL
DIRECTION (T)	190	
HEIGHT IN FEET	2	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (T)
0	27.62	.0516	32.05	4	.3	160
6	27.15	.0512	32.04	12	.3	145
12	27.10	.0511	32.06	20	.3	125
20	27.08	.0512	32.09			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	7 Feb. 68	0405 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLICE NO
11	12 32.7'N	100 09.3'E	25	11	37

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (XES)	WEATHER	CLOUDS
27.43	DIR 145 SPEED 2	WET 25.0 DRY 30.0		Clr	COVER 1/10 TYPE Ci

WAVES	SEA	SWELL
DIRECTION (T)	120	
HEIGHT IN FEET	2	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (T)
0	27.43	.0515	32.07	4	.7	125
10	27.09	.0511	32.06	13	.6	150
23	27.09	.0511	32.06	23	.5	130

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	9 Feb. 68	0115 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLICE NO
13	12 37.7'N	100 01.2'E	15	13	39

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (XES)	WEATHER	CLOUDS
27.09	DIR 210 SPEED 5	WET 23.3 DRY 25.6		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (T)	120	
HEIGHT IN FEET	2	
PERIOD IN SEC		

REMARKS: Two distinct current directions at 4m.

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (T)
0	27.09	.0510	31.99	4	.2	180&045
6	27.13	.0511	32.02	12	.2	-
13	27.16	.0511	32.00			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	Gulf of THAILAND	21 Feb. 68	0215 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLICE NO
14	12 37.5'N	100 05.2'E	15		57

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (XES)	WEATHER	CLOUDS
27.14	DIR 050 SPEED 3	WET 23.3 DRY 26.1		Bkn	COVER 6/10 TYPE CiCu

WAVES	SEA	SWELL
DIRECTION (T)		140
HEIGHT IN FEET		5
PERIOD IN SEC		6

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (T)
0	27.14	.0512	32.12	-	-	-
13	27.10	.0512	32.11			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	21 Feb.68	0655 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLICE NO
15	12 37.3'N	100 09.9'E	22		58

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (Elev)	WEATHER	CLOUDS
27.41	DIR 090 SPEED 10to13	WET 23.9 DRY 26.7		Cldy	COVER 9/10 TYPE Cu

WAVES	SEA	SWELL	REMARKS
DIRECTION (°T)	080		
HEIGHT IN FEET	5		
PERIOD IN SEC			

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	27.41	.0514	32.05	-	-	-
19	27.17	.0513	32.10			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	9 Feb. 68	0430 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLICE NO
17	12 41.2'N	100 02.8'E	16	17	40

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (Elev)	WEATHER	CLOUDS
27.69	DIR 140 SPEED 7	WET 25.0 DRY 29.4		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL	REMARKS
DIRECTION (°T)	120		
HEIGHT IN FEET	2		
PERIOD IN SEC			

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	27.69	.0517	32.04	4	.3	170
6	27.29	.0514	32.09	15	.2	170
14	27.29	.0514	32.07			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	10 Feb. 68	0135 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLICE NO
18	12 41.0'N	100 07.8'E	25	18	42

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (Elev)	WEATHER	CLOUDS
27.21	DIR 260 SPEED 3	WET 25.0 DRY 26.7		Clr	COVER 1/10 TYPE CiCu

WAVES	SEA	SWELL	REMARKS
DIRECTION (°T)	120		
HEIGHT IN FEET	3		
PERIOD IN SEC			

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	27.21	-	-	3	.2	145
10	27.20	.0512	32.06	12	.3	185
23	27.21	.0512	32.05	23	.2	230

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	10 Feb. 68	0510 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLICE NO
19	12 40.4'N	100 12.7'E	24	19	43

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (Elev)	WEATHER	CLOUDS
27.50	DIR 110 SPEED < 2	WET 25.0 DRY 30.0		Cldy	COVER 7/10 TYPE CiCu

WAVES	SEA	SWELL	REMARKS
DIRECTION (°T)	Calm		
HEIGHT IN FEET			
PERIOD IN SEC			

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	27.50	.0516	32.10	3	.2	155
10	27.27	.0514	32.10	12	.3	150
22	27.29	-	-	22	.3	125

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	9 Feb. 68	0755 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
21	12 44.7'N	100 02.0'E	12	21	41

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KES)	WEATHER	CLOUDS
27.73	DIR 140 SPEED 10to13	WET 26.1 DRY 30.0		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (°T)	110	
HEIGHT IN FEET	3	
PERIOD IN SEC		

REMARKS: Current vectors very erratic.

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	27.73	.0515	31.90	1	.2	270
5	27.56	.0515	32.00	4	.2	185
10	27.35	.0513	32.00	10	.3	230

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	1 Feb. 68	0740 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
25	13 18.3'N	100 37.3'E	16		31

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KES)	WEATHER	CLOUDS
27.16	DIR 165 SPEED 9to12	WET 25.6 DRY 28.9		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (°T)	150	
HEIGHT IN FEET	3	
PERIOD IN SEC		

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	27.16	.0507	31.70	-	-	-
7	27.11	.0506	31.70			
14	26.96	.0505	31.72			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	2 Feb. 68	0040 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
26	13 12.8'N	100 37.2'E	19	26	32

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KES)	WEATHER	CLOUDS
26.89	DIR 340 SPEED 6to8	WET 21.7 DRY 26.7		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (°T)	330	
HEIGHT IN FEET	3	
PERIOD IN SEC		

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	26.89	.0509	32.02	4	.3	005
8	26.91	.0508	31.98	10	.2	355
17	26.94	.0508	31.99	17	.2	005

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	25 Jan. 68	0050 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
27	13 13.7'N	100 49.2'E	16		29

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KES)	WEATHER	CLOUDS
26.73	DIR 180 SPEED 4to6	WET 24.5 DRY 27.2		Bkn	COVER 6/10 TYPE Cu

WAVES	SEA	SWELL
DIRECTION (°T)	180	
HEIGHT IN FEET	2	
PERIOD IN SEC		

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	26.73	.0508	32.12	-	-	-
7	26.74	.0509	32.15			
14	26.76	.0509	32.11			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	25 Jan 68	0345 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
28	13 11.7'N	100 44.8'E	27		30

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KES)	WEATHER	CLOUDS
26.91	DIR 180 SPEED 4	WET 25.6 DRY 30.6		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (°T)	190	
HEIGHT IN FEET	2	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	26.91	.0511	32.14	-	-	-
11	26.68	.0508	32.09			
25	26.60	.0507	32.11			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	24 Jan. 68	0110 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
29	13 09.5'N	100 40.4'E	22	29	26

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KES)	WEATHER	CLOUDS
26.70	DIR 170 SPEED .7	WET 24.4 DRY 27.2		Bkn	COVER 6/10 TYPE Cu

WAVES	SEA	SWELL
DIRECTION (°T)	170	
HEIGHT IN FEET	3	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	26.70	.0509	32.14	3	.3	340
10	26.71	.0508	32.12	11	.2	000
20	26.74	.0509	32.15	20	< .2	Appx. 345

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	2 Feb. 68	0320 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
30	13 07.3'N	100 35.7'E	22	30	33

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KES)	WEATHER	CLOUDS
27.09	DIR 040 SPEED .3	WET 23.4 DRY 28.4		Clr	COVER 1/10 TYPE Ci

WAVES	SEA	SWELL
DIRECTION (°T)	150	
HEIGHT IN FEET	1	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	27.09	.0512	32.09	4	.3	155
10	26.99	.0511	32.09	12	.4	150
20	27.00	.0511	32.09	20	.3	205

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	24 Jan. 68	0745 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
31	13 05.6'N	100 49.9'E	25	31	28

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KES)	WEATHER	CLOUDS
27.22	DIR 190 SPEED 5to8	WET 25.0 DRY 28.4		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (°T)	160	
HEIGHT IN FEET	2	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	27.22	.0512	32.01	4	.3	190
11	26.84	.0509	32.10	13	.5	190
23	26.85	.0509	32.10	23	.3	185

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	23 Jan. 68	0855 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
32	13 03.1'N	100 50.6'E	19	32	25

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KBS)	WEATHER	CLOUDS
27.07	DIR 335 SPEED 8to11	WET 23.9 DRY 25.6		Cldy	COVER 9/10 TYPE StCu

WAVES	SEA	SWELL
DIRECTION (°T)	035	
HEIGHT IN FEET	3	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP.	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	27.07	.512	32.10	3	< .2	175
7	26.91	.0510	32.10	10	.3	190
17	26.83	.0509	32.09	18	< .2	-

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	20 Jan. 68	0420 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
33	13 02.6'E	100 47.5'E	31	33	19

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KBS)	WEATHER	CLOUDS
27.06	DIR 070 SPEED 3	WET 25.0 DRY 29.4		Clr	COVER 1/10 TYPE Cu

WAVES	SEA	SWELL
DIRECTION (°T)	-	
HEIGHT IN FEET	-	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP.	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	27.06	.0512	32.09	3	.3	180
7	26.87	.0510	32.10	10	.3	150
14	26.88	.0510	32.12	29	.2	145
29	26.89	.0510	32.11			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	23 Jan. 68	0430 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
34	13 01.8'N	100 43.0'E	21	34	24

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KBS)	WEATHER	CLOUDS
27.03	DIR 180 SPEED 9to12	WET 25.0 DRY 28.4		Bkn	COVER 6/10 TYPE Cu

WAVES	SEA	SWELL
DIRECTION (°T)	220	
HEIGHT IN FEET	3	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	27.03	.0512	32.17	4	.5	210
10	26.95	.0512	32.18	10	.6	160
20	26.96	.0512	32.17	19	.6	165

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	23 Jan. 68	0105 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
35	13 01.0'N	100 38.5'E	29	35	23

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KBS)	WEATHER	CLOUDS
26.94	DIR 010 SPEED 6to8	WET 24.1 DRY 29.1		Bkn	COVER 4/10 TYPE CiCu

WAVES	SEA	SWELL
DIRECTION (°T)	025	
HEIGHT IN FEET	3	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP.	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	26.94	.0511	32.16	3	.3	350
14	26.91	.0511	32.16	14	< .2	Appx.030
27	26.89	.0511	32.16	25	.2	095

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	20 Jan. 68	0710 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	ST SLIDE NO
36	13 00.5'N	100 50.9'E	19	36	20

SEA SURF TEMP	WIND (Elev.)	AIR TEMP	BAROMETER (INS)	WEATHER	CLOUDS
27.32	DIR 320 SPEED 4to7	WET 25.6 DRY 30.5		Clr	COVER 1/10 TYPE CiCu

WAVES	SEA	SWELL
DIRECTION (°T)	-	
HEIGHT IN FEET		
PERIOD IN SEC		

REMARKS: Current velocities too low to record.

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED (KTS)	CURRENT DIR (°T)
0	27.32	.0514	32.10	See remarks		
8	26.83	.0509	32.08			
18	26.83	-	-			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	22 Jan. 68	0450 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	ST SLIDE NO
37	12 57.9'N	100 37.9'E	28	37	21

SEA SURF TEMP	WIND (Elev.)	AIR TEMP	BAROMETER (INS)	WEATHER	CLOUDS
27.08	DIR 160 SPEED 5to7	WET 25.0 DRY 27.8		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (°T)	180	
HEIGHT IN FEET	2	
PERIOD IN SEC		

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED (KTS)	CURRENT DIR (°T)
0	27.08	.0513	32.14	3	-	200
5	26.91	.0511	32.14	12	.7	175
10	26.88	.0511	32.14	25	.6	180
26	26.87	.0510	32.12			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	4 Jan. 68	0435 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	ST SLIDE NO
38	12 51.8'N	100 48.5'E	21	38	7

SEA SURF TEMP	WIND (Elev.)	AIR TEMP	BAROMETER (INS)	WEATHER	CLOUDS
26.55	DIR 015 SPEED 5to11	WET 19.5 DRY 25.6		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (°T)	-	-
HEIGHT IN FEET		
PERIOD IN SEC		

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED (KTS)	CURRENT DIR (°T)
0	26.55	.0504	31.90	3	.4	100
10	26.52	.0503	31.90	11	.5	255
20	26.50	.0503	31.89	18	.2	-

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	4 Jan. 68	0820 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	ST SLIDE NO
41A	12 46.9'N	100 49.4'E	22	41A	8

SEA SURF TEMP	WIND (Elev.)	AIR TEMP	BAROMETER (INS)	WEATHER	CLOUDS
26.77	DIR 330 SPEED 15to18	WET 21.1 DRY 27.8		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (°T)	330	
HEIGHT IN FEET	4	
PERIOD IN SEC		

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED (KTS)	CURRENT DIR (°T)
0	26.77	.0506	31.91	3	.4	235
10	26.74	.0505	31.91	12	.7	240
20	26.76	.0506	31.91	-	-	-

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	19 Jan. 68	0200 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
41B	12 46.9'N	100 49.4'E	19		16

SEA SURF TEMP	WIND (Elev:)	AIR TEMP	BAROMETER (MBS)	WEATHER	CLOUDS
26.91	DIR 0 SPEED 0	WET 25.0 DRY 29.4		Clr	COVER 2/10 TYPE Cu

WAVES	SEA	SWELL
DIRECTION (T)	-	-
HEIGHT IN FEET		
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (T)
0	26.91	.0511	32.16	-	-	-
9	26.86	.0511	32.16			
18	26.87	.0511	32.17			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	20 Dec. 67	0840 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
42	12 46.2'N	100 46.8'E	24		1

SEA SURF TEMP	WIND (Elev:)	AIR TEMP	BAROMETER (MBS)	WEATHER	CLOUDS
27.45	DIR 270 SPEED 2to4	WET 22.8 DRY 27.2		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (T)	270	
HEIGHT IN FEET	1	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (T)
0	27.45	-	-	-	-	-
12	27.01	-	-			
23	27.02	-	-			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	23 Dec. 67	0330 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
44	12 44.3'N	100 38.4'E	38		4

SEA SURF TEMP	WIND (Elev:)	AIR TEMP	BAROMETER (MBS)	WEATHER	CLOUDS
27.21	DIR 286 SPEED 4	WET 22.2 DRY 27.2		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (T)	280	
HEIGHT IN FEET	1	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (T)
0	27.21	-	-	-	-	-
10	27.07	-	-			
23	27.10	-	-			
37	27.09	-	-			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	22 Dec. 67	0400 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
45	12 36.7'N	100 36.9'E	33		2

SEA SURF TEMP	WIND (Elev:)	AIR TEMP	BAROMETER (MBS)	WEATHER	CLOUDS
27.14	DIR 317 SPEED 5	WET 22.8 DRY 27.8		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (T)	-	-
HEIGHT IN FEET		
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (T)
0	27.14	-	-	-	-	-
10	27.10	-	-			
20	27.03	-	-			
31	27.03	-	-			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	13 Feb. 68	0540 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
47	12 35.5'N	100 53.5'E	25	47	45

SEA SURF TEMP	WIND (Elev.)	AIR TEMP	BAROMETER (KBS)	WEATHER	CLOUDS
27.49	DIR 095 SPEED 5	WET 22.8 DRY 27.2		Ovc	COVER 10/10 TYPE St

WAVES	SEA	SWELL
DIRECTION (°T)		120
HEIGHT IN FEET		3
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (°T)
0	27.49	.0518	32.21	4	.8	105
9	27.38	.0516	32.20	13	.6	100
23	27.35	.0517	32.22	23	.4	110

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	13 Feb. 68	0235 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
48	12 32.5'N	100 52.5'E	38	48	44

SEA SURF TEMP	WIND (Elev.)	AIR TEMP	BAROMETER (KBS)	WEATHER	CLOUDS
27.46	DIR 345 SPEED 7to9	WET 22.2 DRY 26.7		Cldy	COVER 9/10 TYPE St

WAVES	SEA	SWELL
DIRECTION (°T)	360	120
HEIGHT IN FEET	2	4
PERIOD IN SEC		5

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (°T)
0	27.46	.0518	32.26	3	.3	145
10	27.49	.0518	32.23	19	.5	105
36	27.52	.0518	32.22	35	.4	080

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	3 Feb. 68	0855 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
49	12 29.8'N	100 51.0'E	40	49	35

SEA SURF TEMP	WIND (Elev.)	AIR TEMP	BAROMETER (KBS)	WEATHER	CLOUDS
27.63	DIR 140 SPEED 7	WET 25.6 DRY 28.9		Bkn	COVER 5/10 TYPE Cu

WAVES	SEA	SWELL
DIRECTION (°T)	140	
HEIGHT IN FEET	3	
PERIOD IN SEC		

REMARKS: **Two distinct directions for the current at 38m. .**

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (°T)
0	27.63	.0519	32.24	4	.4	305
10	27.30	.0516	32.22	20	.3	300
24	27.29	.0516	32.23	38	.3	311&047
38	27.30	.0516	32.23			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	6 Jan. 68	0410 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
52	12 24.7'N	101 04.7'E	30	52	9

SEA SURF TEMP	WIND (Elev.)	AIR TEMP	BAROMETER (KBS)	WEATHER	CLOUDS
26.58	DIR 315 SPEED 5	WET 20.6 DRY 26.1		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (°T)	315	
HEIGHT IN FEET	2	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (°T)
0	26.58	.0504	31.91	3	< .2	-
9	26.54	.0503	31.91	15	< .2	085
19	26.55	.0504	31.91	28	< .2	-
29	26.53	.0503	31.90			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	16 Jan 68	0350 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
57	12 27.7'N	101 07.3'E	22	57	9

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KBS)	WEATHER	CLOUDS
26.54	DIR 340 SPEED 4	WET 20.0 DRY 25.0		Clr	COVER 1/10 TYPE Ci

WAVES	SEA	SWELL	REMARKS
DIRECTION (°T)		000	
HEIGHT IN FEET		3	
PERIOD IN SEC		3	

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	26.54	.0505	32.02	3	.3	150
11	26.54	.0505	32.01	10	.2	112
21	26.56	.0506	32.04	20	< .2	103

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	16 Jan. 68	0815 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
61	12 25.5'N	101 14.8'E	30	61	12

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KBS)	WEATHER	CLOUDS
26.75	DIR 230 SPEED .6	WET 22.2 DRY 28.9		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL	REMARKS
DIRECTION (°T)		220	
HEIGHT IN FEET		4	
PERIOD IN SEC		4	

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	26.75	.0512	32.34	3	.2	145
7	26.72	.0510	32.24	8	.3	113
28	26.66	.0510	32.25	22	-	-

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	16 Jan. 68	0700 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
62	12 21.2'N	101 12.3'E	31	62	11

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KBS)	WEATHER	CLOUDS
26.85	DIR 060 SPEED .5	WET 21.7 DRY 27.8		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL	REMARKS
DIRECTION (°T)	-	-	
HEIGHT IN FEET			
PERIOD IN SEC			

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	26.85	.0514	32.35	3	< .2	-
10	26.77	.0512	32.34	10	< .2	150
20	26.76	.0513	32.36	28	-	-
30	26.75	.0512	32.34			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	17 Jan 68	0130 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
66	12 22.6'N	101 31.3'E	31	66	13

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KBS)	WEATHER	CLOUDS
26.66	DIR 040 SPEED .6	WET 21.7 DRY 25.6		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL	REMARKS
DIRECTION (°T)	040		
HEIGHT IN FEET	3		
PERIOD IN SEC			

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	26.66	.0512	32.37	3	.2	305
15	26.65	.0511	32.36	15	.2	195
30	26.67	.0512	32.36	28	< .2	310

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	17 Jan. 68	0350 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLICE NO
67	12 17.2'N	101 31.8'E	34	67	14

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KES)	WEATHER	CLOUDS
26.93	DIR 208 SPEED 7	WET 21.1 DRY 25.6		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL	REMARKS
DIRECTION (°T)	-	-	
HEIGHT IN FEET			
PERIOD IN SEC			

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	26.93	.0515	32.43	3	.4	147
11	26.93	.0515	32.43	10	.4	185
22	26.92	.0515	32.43	32	.2	150
33	26.61	.0512	32.43			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	17 Jan. 68	0725 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLICE NO
72	12 17.3'N	101 37.7'E	33	72	15

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KES)	WEATHER	CLOUDS
27.33	DIR 040 SPEED 2to5	WET 22.2 DRY 28.3		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL	REMARKS
DIRECTION (°T)	030		
HEIGHT IN FEET	1		
PERIOD IN SEC			

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	27.33	.0519	32.45	3	.3	235
13	26.96	.0516	32.45	16	< .2	210
22	26.95	.0516	32.45	31	.2	185
32	26.96	.0516	32.45			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	16 Feb. 68	0040 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLICE NO
73	12 17.3'N	100 03.8'E	17	73	49

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KES)	WEATHER	CLOUDS
27.16	DIR 180 SPEED 7to10	WET 23.9 DRY 27.2		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL	REMARKS
DIRECTION (°T)	160		
HEIGHT IN FEET	3		
PERIOD IN SEC			

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	27.16	.0515	32.24	3	.3	090
7	27.17	.0515	32.24	14	.3	230
15	27.20	.0515	32.24			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	24 Jan. 68	0410 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLICE NO
81	13 06.6'N	100 42.8'E	26	81	27

SEA SURF TEMP	WIND (Elev)	AIR TEMP	BAROMETER (KES)	WEATHER	CLOUDS
27.09	DIR 250 SPEED 7to8	WET 25.6 DRY 31.1		Bkn	COVER 4/10 TYPE Cu

WAVES	SEA	SWELL	REMARKS
DIRECTION (°T)	120		
HEIGHT IN FEET	2		
PERIOD IN SEC			

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (°T)
0	27.09	-	-	4	.5	180
12	26.93	.0511	32.17	13	.3	180
24	26.95	.0512	32.16	24	.4	190

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	20 Jan. 68	0100 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
82	12 59.8'N	100 46.5'E	31	82	18

SEA SURF TEMP	WIND (Elev: DIR / SPEED)	AIR TEMP WET / DRY	BAROMETER (CES)	WEATHER	CLOUDS COVER / TYPE
26.81	DIR 015 / SPEED 2	WET 25.0 / DRY 28.3		Bkn	COVER 5/10 / TYPE Cu

WAVES	SEA	SWELL
DIRECTION (T)	130	
HEIGHT IN FEET	1	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (T)
0	26.81	.0509	32.10	3	.4	015
9	26.83	.0509	32.10	15	.3	025
18	26.80	.0509	32.10	27	.3	015
29	26.79	.0509	32.10			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	22 Jan. 68	0830 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
83	12 59.0'N	100 42.9'E	21	83	22

SEA SURF TEMP	WIND (Elev: DIR / SPEED)	AIR TEMP WET / DRY	BAROMETER (CES)	WEATHER	CLOUDS COVER / TYPE
27.45	DIR 330 / SPEED 7to9	WET 25.0 / DRY 29.4		Clr	COVER 1/10 / TYPE Cu

WAVES	SEA	SWELL
DIRECTION (T)	180	
HEIGHT IN FEET	3	
PERIOD IN SEC		

REMARKS: Current velocities too low to record.

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (T)
0	27.45	.0516	32.17	See remarks		
9	26.95	.0512	32.17			
19	26.94	.0511	32.18			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	19 Jan 68	0530 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
84	12 55.3'N	100 43.4'E	34	84	17

SEA SURF TEMP	WIND (Elev: DIR / SPEED)	AIR TEMP WET / DRY	BAROMETER (CES)	WEATHER	CLOUDS COVER / TYPE
27.39	DIR 035 / SPEED 2to4	WET 24.5 / DRY 27.8		Clr	COVER 1/10 / TYPE Cu

WAVES	SEA	SWELL
DIRECTION (T)	025	
HEIGHT IN FEET	1	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (T)
0	27.39	.0516	32.20	3	-	-
11	26.97	.0512	32.19	13	<.2	150
22	26.96	.0512	32.19			
32	26.94	.0511	32.20			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	3 Jan. 68	0325 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
85	12 41.0'N	100 41.9'E	43		6

SEA SURF TEMP	WIND (Elev: DIR / SPEED)	AIR TEMP WET / DRY	BAROMETER (CES)	WEATHER	CLOUDS COVER / TYPE
27.05	DIR 000 / SPEED 8to11	WET 20.0 / DRY 27.2		Clr	COVER 1/10 / TYPE Ci

WAVES	SEA	SWELL
DIRECTION (T)	000	
HEIGHT IN FEET	3	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (T)
0	27.05	.0510	32.03	-	-	-
13	27.05	.0510	32.03			
26	27.01	.0510	32.03			
41	27.00	.0510	32.03			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	22 Dec. 67	0730 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
88	12 36.9'N	100 41.4'E	46	88	3

SEA SURF TEMP	WIND (Elev: DIR / SPEED)	AIR TEMP WET / DRY	BAROMETER (XXX)	WEATHER	CLOUDS COVER / TYPE
27.52	DIR 275 SPEED 5to7	WET 23.9 DRY 30.6		Clr	COVER 0 TYPE 0

WAVES	SEA	SWELL
DIRECTION (°T)	-	-
HEIGHT IN FEET		
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (°T)
0	27.52	-	-	2	< .2	325
14	27.09	-	-	30	< .2	000
29	27.03	-	-	44	.2	015
44	27.07	-	-			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	3 Feb. 68	0545 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
91	12 27.8'N	100 54.0'E	35	91	34

SEA SURF TEMP	WIND (Elev: DIR / SPEED)	AIR TEMP WET / DRY	BAROMETER (XXX)	WEATHER	CLOUDS COVER / TYPE
27.32	DIR 140 SPEED 11	WET 25.0 DRY 29.4		Clr	COVER 3/10 TYPE Cu

WAVES	SEA	SWELL
DIRECTION (°T)	150	
HEIGHT IN FEET	3	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (°T)
0	27.32	.0516	32.26	4	.5	110
8	27.32	.0516	32.26	19	.5	100
20	27.36	.0517	32.27	33	.4	115
33	27.03	.0513	32.27			

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	14 Feb. 68	0725 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
92	12 31.0'N	100 44.4'E	32	92	46

SEA SURF TEMP	WIND (Elev: DIR / SPEED)	AIR TEMP WET / DRY	BAROMETER (XXX)	WEATHER	CLOUDS COVER / TYPE
27.54	DIR 160 SPEED 6to8	WET 25.0 DRY 30.6		Bkn	COVER 4/10 TYPE Cu

WAVES	SEA	SWELL
DIRECTION (°T)		120
HEIGHT IN FEET		3
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (°T)
0	27.54	.0517	32.20	4	-	-
10	27.34	.0515	32.20	18	.4	285
30	27.35	.0516	32.19	30	.3	085

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	15 Feb. 68	0400 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	BT SLIDE NO
93	12 25.5'N	100 41.3'E	32	93	47

SEA SURF TEMP	WIND (Elev: DIR / SPEED)	AIR TEMP WET / DRY	BAROMETER (XXX)	WEATHER	CLOUDS COVER / TYPE
27.27	DIR 140 SPEED 8to10	WET 24.4 DRY 27.8		Ovc	COVER 10/10 TYPE CiCu

WAVES	SEA	SWELL
DIRECTION (°T)	140	
HEIGHT IN FEET	3	
PERIOD IN SEC		

REMARKS

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT DEPTH	CURRENT SPEED(KTS)	CURRENT DIR (°T)
0	27.27	.0515	32.19	4	.3	130
15	27.26	.0515	32.19	15	.5	105
30	27.31	.0515	32.18	30	.3	180

VESSEL	AREA	DATE	TIME
HTMS BANGRACHAN	GULF of THAILAND	15 Feb. 68	0740 G.M.T.

OS NO	LATITUDE	LONGITUDE	DEPTH	CUR STA NO	ST SLICE NO
94	12 22.2'N	100 38.0'E	31	94	48

SEA SURF TEMP	WIND (Elev:	AIR TEMP	BAROMETER (Elev:	WEATHER	CLOUDS
27.50	DIR 150 SPEED 8to10	WET 24.4 DRY 30.0		Clr	COVER 1/10 TYPE Cu

WAVES	SEA	SWELL
DIRECTION (T)	140	
HEIGHT IN FEET	4	
PERIOD IN SEC		

REMARKS

Two distinct current directions at 16m.

DEPTH	TEMP	E.C. (mhos)	SAL (‰)	CURRENT		
				DEPTH	SPEED(KTS)	DIR (T)
0	27.50	.0518	32.27	3	.5	290
10	27.41	.0518	32.28	16	.4	070&270
29	27.42	.0517	32.27	29	.4	070

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11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	U.S. Naval Oceanographic Office

13. ABSTRACT

The U.S. Naval Oceanographic Office and the Royal Thai Navy conducted a joint environmental survey in the Gulf of Thailand from 20 December 1967 to 21 February 1968. Operations included serial-depth temperature and salinity measurements at 57 station locations and current meter observations at 47 of the stations.

The area surveyed in the Gulf of Thailand was found to be nearly isothermal and isohaline throughout the water column which attests to a well-developed mixing environment. The tidal currents in the gulf are thought to be responsible for the homogenous nature of the water. Characteristic of the region surveyed was the variance in current direction with depth for any one station location and the change in current vectors over short durations. Measured current speeds ranged to a maximum of 0.8 knot.

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
GULF OF THAILAND CURRENT MEASUREMENTS ENVIRONMENTAL DATA						